Clinical Cases.

A CASE OF PROFESSIONAL NEUROSIS OF CO-ORDINATION OF UNUSUAL ORIGIN.

By PHILIP COOMBS KNAPP, A.M., M.D.,

PHYSICIAN TO OUT-PATIENTS WITH DISEASES OF THE NERVOUS SYSTEM, BOSTON CITY HOSPITAL.

The symptoms which are classed under the various headings of professional neuroses of co-ordination (co-ordinatorische Beschäftigungsneurosen, Benedikt), professional hyperkineses (Ross), anapeiratic paralyses (Hammond), copodyscinesia (Lewis), the neural disorders of writers and artisans (Lewis), or, in common parlance, the various "cramps"—writers', telegraphers', or pianists'—may arise, as is well known, from almost any occupation requiring protracted use of the muscles. The commonest form, which is regarded as the type of the affection, is writers' cramp, and next in frequency comes telegraphers' cramp, which attacks especially those who use the Morse key. Beside these comparatively common forms, there are numerous others, which are quite rare and are of interest mainly as curiosities. Among these are hammerman's palsy, pianists', milkers', violinists', cello-players', and ballet-dancers' cramps. Dieulafoy cites a case of cramp in a cellar-man, which was due to his habit of giving a slight rotation to a champagne bottle whenever he served champagne; Poore[1] tells of a watchmaker who could not hold the lens in his eye, and of a pickle-jar tyer who could not hold the cover of a jar; and Lewis tells of a woman who had cramp in the fingers, which, as she was blind, she used for reading the raised type. Although the hands and arms are the parts most often affected, the cases cited above show that other parts may also be involved. Zenner's recent case[2] of auctioneers' cramp shows, also, that the lips and tongue may be affected, and spasm of the larynx has been observed in clarionet-players (Eichhorst).

As Lewis says,[3] "all occupations which require a muscle or a

[1] Lancet, August 21st, 1886.
[2] Reported to the American Neurological Society, 1886.
[3] Pepper's "System of Medicine," vol. v., p. 511.

group of muscles to be kept in a constant more or less firm contraction, together with fine movements of co-ordination in themselves and in the neighboring muscles, may be expected to furnish cases of this class of disease; the muscles affected necessarily varying with the work done, mere routine work being more liable to cause trouble than that which is new and original, as in the latter case time has to be taken to elaborate it, thus giving temporary rest to the muscles." It would seem that the tonic contraction of the muscles is more injurious than the rapid and fine movements of co-ordination; for Poore, who has made a careful study of the muscles affected in writers' cramp, claims that the muscles of penprehension are first affected.

The pathology of the disease is still obscure. Erb,[1] some years ago, said: "In the present state of our knowledge, we are justified in placing the seat of the cause of the typical forms of writers' spasm in the central nervous system, although we are not in a position to locate it with precision. Whether the trophic disturbance is to be sought for in the gray substance of the cervical portion of the spinal cord, or in the cerebral peduncles, or, lastly, in the gray substance of the brain, can only be determined by future investigation." Many writers claim that the disease is of central origin, but others think that it is at first peripheral, but by abuse it may become central (spinal). "The latter theory," says Lewis again,[2] "and not the idea that it is a disease of the co-ordinating centres in the brain, or of the spinal centres only, best explains, in my opinion, the various symptoms encountered. . . . Exactly what the alteration in the condition of the spinal cord is which probably occurs in many of these cases it is impossible to state, but the view that it is a nutritive change of the upper dorsal and lower cervical portion of the spinal cord (that is, when the arm is the part affected, as it is in all but the rarer cases) is quite attractive, the condition being secondary to a peripheral irritation in many cases." Weir Mitchell states that subacute neuritis is often incapable of distinct clinical discrimination, when of a mild type, and when there is an absence of traumatic cause. Eichhorst says[3] that "the disease is probably the result of purely functional disturbances. These are evidently situated in the spinal cord, because the act of writing requires the delicate co-ordination of adjacent groups of muscles, and the co-ordinating centres of these muscles are situated in the cervical enlargement of the cord. Abnormal irritability, ready exhaustion, and irregular stimulation of these centres suffice to explain the symptoms of writers' cramp. In some cases, however, the primary disturbance is situated in the brain, as is shown by the feeling of pressure in the head, vertigo, mental depression, etc. In

[1] Ziemssen's "Cyclopædia," vol. ix., p. 155.
[2] Op. cit., pp. 528, 530.
[3] "Handbuch der speciellen Pathologie and Therapie," Bd. ii., p. 566. Ed. 1883.

other cases, the starting-point is at the periphery (neuritis, periostitis, etc.)." The case which I shall report seems to be of this latter type, perhaps one of the cases of neuritis of which Weir Mitchell speaks.

The symptoms of these professional neuroses are not by any means all of the same type. Benedikt has arranged them under three classes: the spastic, the tremulous, and the paralytic forms. Of the latter, Erb says:[1] "Fatigue and weakness of the hand constitute prominent symptoms, in which there are no distinct spasms, but in which paralysis is more or less well marked, though, perhaps, it is only observable when the patient attempts to write. A gradually increasing and very decided sense of fatigue is experienced in the hand and forearm, which become, as it were, stiff and are no longer capable of being moved; pain is felt in the whole arm, and, if the act of writing is persisted in, it extends to the shoulder and back." This form is said by Eichhorst to be the rarest.

Although this classification is the one generally accepted, Lewis has proposed a more elaborate one, under one form of which the case I am about to report can better be placed than under Benedikt's paralytic form. He classifies the symptoms under five heads: cramp, paresis, tremor, pain or perversion of sensation, and vaso-motor and trophic disturbances. Under the fourth head, he writes:[2] "Every case of copodyscinesia, without exception, has at one period or another of the disease some modification of normal sensation in the hand or arm. Usually the very first symptom that attracts the patient's attention is a sense of fatigue or tire in the hand or arm, which at first appears only after a considerable amount of work. . . . If the work is continued, the sensation increases. . . . When a subacute neuritis is present, as frequently occurs, all the symptoms common to that condition appear, viz.: pain over the various nerve-trunks and at the points of emergence of their branches, either spontaneous or only solicited on pressure; areas of hyperæsthesia or anæsthesia; a sense of itching or tingling or pricking in the arm or hand; or a sense of numbness, causing the part to fall asleep." In the following case, there was probably this latter condition of subacute neuritis:

Miss D., 23, single, is a carpet-pattern-setter at the Roxbury Carpet Works. On the 17th of May, 1886, she came to the nervous out-patient room at the Boston City Hospital, and gave the following history: Although always of a nervous temperament, she has been in good health until three or four weeks ago, when she began to have pain in both her hands, extending up to the arms to about the elbows. She had been working constantly before this attack, but knew of no injury or exposure to cold which might have caused her trouble. The pain was quite severe and at times rather sharp, although usually of a duller and more

[1] Op. cit., p. 350.
[2] Op. cit., p. 519.

fixed character. No special numbness or paræsthesia was noted, but the hands and arms felt lifeless and were easily fatigued. The trouble was worse upon the left side. On trying to set patterns, these symptoms were aggravated. Some trouble was experienced in doing the finer work at home, such as sewing, while coarser work, like sweeping, was easier. Any attempt to use the arms, however, caused some disturbance. She never noticed any spasm while at her work, and had no special difficulty in the co-ordination of motion, although, as I said, the motion itself aggravated the trouble. With the exception of this trouble, she felt quite well. There were no cerebral symptoms, beyond occasional headaches, such as she always had; and the thoracic, abdominal, and pelvic viscera performed their various functions in a normal manner.

The physical examination showed a girl below the ordinary height, extremely slender, and with particularly small arms. There were no signs of anæmia or of special emaciation, and she had noticed no diminution in the size of her arms since this trouble came on. The various movements of the hand and arm were performed without difficulty. On the ulnar sides of the hands, there was a faint diminution of sensation, and pressure over the nerve-trunks in the forearm caused some pain, especially over the left ulnar nerve near the elbow. Unfortunately, no electrical examination was made, and the dynamometer was not used to test the strength of the muscles; and the patient's failure to return at the the time specified precluded any attempts at a more elaborate examination.

The character of the symptoms, their distribution, the absence of any other cause, like injury or exposure to cold, and the fact that the symptoms were aggravated by renewed attempts to work, at once led me to think that the cause of the trouble might be found in the patient's occupation. By the kindness of Mr. F. E. Simpson, the treasurer of the Roxbury Carpet Company, I was enabled to inspect the process of pattern-setting.

The girls employed to set patterns work in a large room, well-lighted and well-ventilated. The foreman at the factory informed me that the work was considered the most desirable in the factory, as the pay was good and the work was considered easy. Neither he nor my patient had ever heard of any similar trouble among the employés in that department. Two girls are employed on each pattern. They sit on either side of a table along which the threads for the pattern run. In an ordinary tapestry, or Brussels carpet, the pattern is formed by the longitudinal threads of the web—the warp. Each individual thread, which is dyed at various colors through its length, is wound on a spool, and these spools, in number equal to the threads of the warp, are placed, on a large table, on pegs on which they can turn. Each thread is then drawn off from the spool and runs under a clamp and along the table at which the two girls sit, so that the threads of the warp, several hundred in number, as they lie along this table, show somewhat indistinctly the pattern of the carpet. Having these threads thus be-

fore them, the two girls then proceed to get them into order, so that the pattern may be exact. With one hand on the spool side of the clamp, they pick up one thread after another, as necessary, and tighten or slacken it, in order to bring the colored parts into their proper places. The other hand is kept on the table arranging the threads in their proper order side by side, picking out those threads whose tension is too small or too great, and helping the other hand in regulating the tension. When the threads before them are all arranged, a second clamp, by the side of the first, is brought down, so as to make them fast, and they are then wound off on to a large cylinder, from which they are woven. In case of doubt, each girl has the pattern by her side, to aid her in arranging the threads. As the two girls face each other, it will, of course, be seen that they use different hands for regulating the tension and for arranging the threads, according to the side of the table on which they sit; but, in the case reported, I was unable to learn which hand was used to regulate the tension, and which to arrange the thread.

The process with the hand that regulates the tension is one that requires the use of the thumb and fingers in simple flexion and extension in picking up the threads, and also a slight lateral movement of the hand in pulling the thread one way or the other. The other hand is held in a more rigid position; all the fingers are employed, not only in flexion and extension, requiring the action of the lumbricales especially, but also in slight lateral movements, which would probably be performed by the interossei. The movements required are usually so slight that the muscles of the forearm, except the extensors and flexors of the fingers, would not often be called into use. This process particularly would seem to furnish the delicate movements of co-ordination and the state of muscular tension requisite for the production of the morbid phenomena. The process first described requires somewhat less complex movements, but still it might well give rise to such phenomena.

The case was not under observation long enough for careful study, but its evident ætiology makes it of interest from the fact that, as far as my knowledge goes, this special cause for a professional neurosis of co-ordination has never been reported before.